

ACHIEVING STRATEGIC EFFECTS WITH ARMY ATTACK AVIATION

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General Studies

by

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## ABSTRACT

ACHIEVING STRATEGIC EFFECTS WITH ARMY ATTACK AVIATION, by MAJ William G. Eldridge, 70 pages.

The United States Army is transforming into a lighter force while simultaneously becoming involved in a growing worldwide spectrum of joint operations. The problem is that future warfare may not permit the marshalling of large fixed-wing air armadas to wage strategic air campaigns. Thus, the central research question is: Can Army attack aviation achieve strategic effects? Using a table of typical theater strategic targets and desired effects derived from current joint doctrine and the principles of effects-based operations, the capabilities of the Army's attack aviation were tested. Additionally, two case studies, Operation Earnest Will and Operation Allied Force (Task Force Hawk), provided historical examples of independent Army attack aviation deployments in direct support of a theater commander's strategic objectives. With its unique abilities of observation, instant battle damage assessment, precision weapons employment with the AGM-114 Hellfire missile, and in the case of Operation Earnest Will, rapid deployment, the Army's attack aviation can have decisive effects on many theater strategic targets. Army attack aviation does have weaknesses, such as doctrinal traditions, weather capability, range, and enemy air defense vulnerability, but none of these weaknesses restrict its employment in a strategic role.

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## ACRONYMS

ACC	Air Combat Command
AGM	air-to-ground missile
AUTL	Army universal task list
C4I	command, control, communications, computers, and information
EBO	effects-based operations
FM	field manual
FLIR	forward looking infrared
IO	information operations
JFACC	Joint Forces Air Component Commander
JMEM	joint munitions effectiveness manuals
NATO	North Atlantic Treaty Organization
ST	strategic task
TBM	theater ballistic missile
TEL	transporter-erector-launchers
UJTL	Universal Joint Task List
USAF	United States Air Force
USN	United States Navy
WMD	weapons of mass destruction

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## CHAPTER 1

### INTRODUCTION

The United States Army is transforming to a lighter force while simultaneously becoming involved in a growing worldwide spectrum of operations. However, the resources to fuel these operations are continually shrinking. It is therefore imperative that all of the Army's assets be used to the full extent of their capabilities.

In operations Desert Storm, Allied Force, and Enduring Freedom, strategic air campaigns designed to achieve strategic effects were fought primarily using the fixed-wing assets of the United States Air Force (USAF), United States Navy (USN), and the United States Marine Corps. The Army's attack aviation played small supporting roles in these strategic air campaigns, or in the case of Operation Allied Force, no role at all. For a variety of reasons, marshalling large fixed-wing air armadas to wage a strategic air war may not be possible in future conflicts. If capable, the decisive strategic force may have to be the Army's attack aviation.

#### The Research Question

This paper attempts to answer questions about Army attack aviation's ability to achieve theater strategic effects. The primary research question asks if Army attack aviation is capable of achieving theater strategic effects in today's battlespace. Following from this question, two subordinate questions are addressed: what are strategic effects, and what are the capabilities of today's Army attack aviation assets? From these subordinate questions, other questions naturally follow, such as how does today's doctrine define strategic war and strategic effects, what doctrinal roles does the Army

assign to its attack aviation, what are the weapon system capabilities of today's attack aviation, and are there recent historic operational examples illustrating the Army's attack aviation assets achieving strategic effects? These research questions were indirectly the topics of recent military periodicals and symposiums.

#### Background of the Problem and the Research Question

Two journal articles and a seminar on air and space power inspired the thesis and subordinate questions. The first journal article, by David Crist, a historian at the Marine Corps Historical Center, written in the autumn 2001 and winter 2002 edition of *Joint Force Quarterly* (Crist 2001-2002, 15), outlined the joint operational challenges of helicopter operations in support of Operation Earnest Will in the Persian Gulf. This operation, conducted in 1987 primarily by Army attack aviation flying from makeshift USN platforms, kept the Persian Gulf open for oil tanker traffic despite interference from the Iranian Navy. The second article, also from *Joint Force Quarterly*, written by RAND defense analysts John Gordon, Bruce Nardulli, and Walter Perry, titled, "The Operational Challenges of Task Force Hawk," described the contributions of Army attack aviation during Operation Allied Force (Gordon, Nardulli, and Perry 2001-2002, 52). The two articles contrast the capabilities of Army attack aviation. During Operation Earnest Will, Army attack aviation played a significant strategic role, but in Task Force Hawk the Army's aviation effort did not significantly contribute to the air campaign. These two articles and a seminar on air and space power further defined the thesis question.

During the 2002 Seminar on Air and Space Power sponsored by the Air Force Element of the United States Army Command and General Staff College, USAF Major General David Deptula highlighted the main points of an Air Combat Command (ACC)

white paper written in May 2002 on effects-based operations (EBO). According to the white paper, EBO is essentially a different way of linking strategy to tactical tasks by considering the relationship of a target and the target's effects on the battlespace. The white paper defines EBO as "actions taken against enemy systems designed to achieve specific effects that contribute directly to desired military and political outcomes" (U.S. Department of the Air Force, Air Combat Command 2002, 27). In his article, "Effects-Based Operations: Change in the Nature of Warfare," General Deptula argues that "rendering the enemy force useless is just as effective as eliminating that enemy force" (2001, 11). Additionally, achieving the desired effect is not dependent on a particular military platform--only the capabilities of the weapon system matter. Explaining the selection of weapon platforms for strikes during Desert Storm, Deptula, a key air campaign planner for that operation stated, "Country of origin, service component, special operations force, missile, aircraft, or helicopter--did not matter--desired effect and system capability were the drivers for weapon selection for the air campaign" (2001, 24).

Mixing EBO ideas and Army aviation historical examples from Operation Earnest Will and Task Force Hawk inspired the thesis question. This research explores the technological and doctrinal capabilities of the Army's attack aviation and seeks to discover if the Army can use its aviation assets strategically.

### Operational Definitions of Key Terms

Several doctrinal definitions are used to determine the full extent of Army attack aviation capabilities. First, joint doctrine defines the strategic level of war as:

The level of war at which a nation, often as a group of nations, determines national or multinational (alliance or coalition) security objectives and guidance,

and develops and uses national resources to accomplish these objectives. (U.S. Department of Defense 2001, 415)

Additionally, joint doctrine defines strategic air warfare as:

Air combat and supporting operations designed to effect, through the systematic application of force to a selected series of vital targets, the progressive destruction and disintegration of the enemy's war-making capacity to a point where the enemy no longer retains the ability or the will to wage war. (U.S. Department of Defense 2001, 415)

For this research, strategic effects are defined as decisive and focused actions taken to affect the enemy's situation awareness and his ability to command and control based upon political and military theater objectives. This definition uses the ideas of EBO as applied to strategic warfare planning and target selection. Lastly, chapter 4 defines the technological and doctrinal capabilities of today's Army attack aviation with weaponeering science, Army field manuals (FMs), unclassified military sources, and commercial informational sources.

#### Limitations and Delimitations

There is a tremendous amount of research and scholarly work defining strategy and policy. This research is limited, however, focusing its analysis on only current joint, Army, and Air Force doctrine. Additionally, only the effects and capabilities of the Army's current attack aviation are explored. To limit the size of the thesis project, only two recent historical cases, Operation Earnest Will and Task Force Hawk, are used as examples of Army attack aviation effectiveness in achieving strategic effects. All historical data and capabilities studies are from unclassified sources, or the unclassified portions of classified studies. Capabilities studies on weapons systems are from open-

source documents and commercial publications. While these limitations “fence-out” the scope of the research, delimitations “fence-in” the areas of research.

The research is delimited by only including theater strategic level definitions for determining the Army’s attack aviation capabilities. Additionally, since the research question asks if today’s Army attack aviation assets can achieve strategic effects, historical examples are from two operations occurring after 1986. This delimitation ensures relevant examples that include weapon systems that are in use today. Since the Army has a large and diverse air arm, the research only includes manned, rotary-wing, attack platforms, specifically the AH-64D Apache and the OH-58D Kiowa Warrior, in the capabilities studies. Lift, unmanned, and special forces aviation assets are not included in the analysis. Lastly, only the AGM (air-to-ground)-114 Hellfire missile is closely studied. These limitations and delimitations ensure that this research is sufficiently focused and relevant for today’s Army.

#### Significance of the Study

This research is significant because its conclusions could persuade the Army to recognize the full potential of its attack aviation and to utilize those assets to support its transformation. New strategic roles for its attack aviation assets would compensate for the Army’s planned reduction of heavy fires in its objective force. Additionally, the Army could explore organizations that place all its aviation, including unmanned and fixed-wing aviation, in a single brigade commanded by an airman (aviator). This aviation brigade may need a brigade operations center that would coordinate directly with the theater combined air operations center for waging joint strategic air campaigns. In some cases, the entire brigade could be apportioned to the Joint Forces Air Component

Commander (JFACC) for strategic air warfare operations. Organizing in this way would ensure the unity of effort, centralized command and control, and decentralized execution required for a successful air campaign that fully achieves the objectives of the theater commander. Organizational changes, however, may also require new doctrine and training.

If Army attack aviation assets are capable of achieving strategic effects, new doctrine and field manuals may be required. Of course, the Army's air assets would still need to retain their tactical capabilities, but they could possibly expand their current doctrine and training to include strategic warfare missions. Additionally, the destructive capabilities of the AGM-114 Hellfire, the AH-64D, and OH-58D would require thorough study and review. New doctrine for unmanned and lift assets could also be explored so that all aviation assets are fully integrated in the overall air war effort. Tactics and capabilities derived from new training techniques may require new weapon systems to further expand the strategic effects of the Army's attack aviation.

New technologies that increase the speed, range, and lethality of Army attack aviation would ensure its contributions to strategic warfare. Technologies are already being tested that dramatically increase the speed and range of rotary-wing aviation (Kandebo 2002, 64). Additionally, lethality can be increased with stealthy airframes, long-range precision-guided weapons, and accurate targeting systems. All of these capabilities could elevate the strategic effectiveness of Army aviation. This research is significant because using the Army's attack aviation to achieve strategic effects supports its transformation into a lighter and more strategically mobile force.

## CHAPTER 2

### LITERATURE REVIEW

There are ample sources of information and scholarly works that apply to this research. In fact, limitations are necessary to restrict the amount of material that can be included in the thesis. Only the area of weapons system capabilities, specifically for the AGM-114 Hellfire missile as applied to strategic targets, is lacking in available analytical material. However, software data analysis and surrogate targeting techniques fill that gap in knowledge. By examining each thesis subordinate question, a variety of information and analysis is shown to be available for conducting an in depth investigation. Some of these sources, however, vary widely in opinion.

#### Defining Strategic Warfare

Extensive works from Douhet to John Warden's 1998 book, *The Air Campaign*, define the strategic level of war. However, each differs in how strategic air warfare should be fought and which targets are of strategic importance. Early strategic theorists argued for attacking civilian population centers or a nation's infrastructure to destroy a country's will and means to fight. But today, contemporary authors take advantage of precision weapons capabilities and recommend a more direct approach to achieving strategic effects. The new approach advocates targeting enemy leadership and command support networks. Current doctrine seems to have elements of both the older and newer theorists.

Giulio Douhet was one of the earliest advocates of applying air power for strategic effects. In his book, *The Command of the Air*, Douhet, whose ideas were

influenced by his observations of World War I's fledgling new air machines, argued that massive aerial assaults in future wars would be inevitable. Douhet wrote that these assaults should be focused "upon smashing the material and moral resources of a people caught up in a frightful cataclysm which haunts them everywhere without cease until the final collapse of all social organization" (1983, 61). While Douhet argued that the key to victory was directly targeting an adversary's citizens forcing the collapse of the country, another early air power advocate, Billy Mitchell, argued targeting key infrastructure and economic targets was a more efficient way to achieve future victories.

Published shortly after Douhet's *The Command of the Air*, Mitchell's *Winged Defense* offered a focused approach to strategic targeting. Mitchell wrote:

No longer will the tedious and expensive process of wearing down the enemy's land forces by continuous attacks be resorted to. The air forces will strike immediately at the enemy's manufacturing and food centers, railways, bridges, canals, and harbors. The saving of lives, manpower, and expenditures will be tremendous for the winning side. (Watts 1984, 10)

Mitchell's ideas of targeting key enemy infrastructures and manufacturing became the targeting strategy used by the Allies against Germany and Japan in World War II.

Surveys of World War II strategic bombing strategies, such as R. Cargill Hall's book, *Case Studies in Strategic Bombardment*, present arguments about the still controversial effectiveness of choosing such strategic targets as the focus of the Allied strategic air campaign (Hall 1998, 240). In the nuclear age, strategic targeting theory would change again.

After the Allied victory in World War II and the introduction of nuclear warfare, targeting for strategic effects focused again on civilian centers of population. Assembled works, such as editor Peter Paret's, *Makers of Modern Strategy*, outline the nuclear

targeting strategies of the United States during the 1960's. These strategies included the mutual assured destruction policy with a "preference for attacking civilian as opposed to military targets, and for threatening another's population rather than defending one's own" (Paret 1986, 758). Strategic targeting theory does not change significantly until 1991, when conventional precision-guided weapons were used with devastating effect in Operation Desert Storm.

Credited as the designer of the air campaign during Operation Desert Storm, USAF Colonel (retired) John Warden suggests a parallel approach to strategic air warfare targeting in his 1998 book, *The Air Campaign*. Arguing that an enemy should be viewed as a system of systems, Warden recommends dividing the enemy into five concentric rings of major systems: leadership, key production, infrastructure, population, and fielded forces. Warden argues that attacking the center of the ring (leadership), in conjunction with parallel attacks elsewhere in the system, will result in a "significant change in the system" (1998, 146). Precision weapons and stealth technology, he states, make it possible to avoid costly and unconcentrated attacks on population centers and fielded forces. The quickest way to victory, Warden argues, is to precisely attack the "brain" of the enemy system--its leadership. Warden's ideas on strategic air warfare are not universally adopted. Current joint and army doctrine appear to reflect the earlier theories of strategic warfare, while the Air Force's current doctrine leans toward the theories of Warden.

The most current sources of doctrinal information that define strategic warfare include Joint Publication 1-02 (*Dictionary of Military and Associated Terms*, 12 April 2001), the Chairman of the Joint Chiefs of Staff Manual 3500.04B (*Universal Joint Task*

List, 1 October 1999), Army Field Manual 7-15 (*Army Universal Task List*, 18 July 2002), and Air Force Doctrine Document 1-1 (*Air Force Task List*, 12 August 1998). Each provides definitions of theater strategic war and suggests typical strategic targets. However, each service differs in its definition of strategic warfare and how strategic air warfare should be fought.

Joint Publication 1-02 lists strategic air warfare targets as “key manufacturing systems, sources of raw material, critical material, stockpiles, power systems” (U.S. Department of Defense 2001, 415). This definition resembles Mitchell’s suggested strategic targets. Unlike Mitchell, however, both the *Universal Joint Task List (UJTL)* and the *Army Universal Task List (AUTL)* state that the levels of war--tactical, operational, theater strategic, and national strategic--are linked vertically. Additionally, both documents state that the Army’s tasks, including its aviation tasks, are only suited to accomplish tactical effects. Only after the Army achieves tactical successes, can operational and strategic effects occur. For the Air Force’s aviation, however, the *AUTL* assigns a much different role.

The *AUTL* states that the *Air Force Task List* “contains tasks that may occur at the strategic, operational, and tactical levels of war because aerospace forces operate at all levels of war” (Chairman of the Joint Chiefs of Staff 1999, 2-6). The Air Force agrees, stating in Air Force Doctrine Document 1, “Aerospace power is inherently capable of operating at all levels of war” (U.S. Department of the Air Force 1998, 8). The Air Force’s view on strategic war seems to follow Warden’s parallel attack theories, while the Army favors tactical warfare--even for its aviation. Current doctrine documents do

not seem to be consistent in their view of how airpower, regardless of service origin, should be applied.

Despite the theoretical differences in defining strategic warfare and strategic targets, the recent views of Warden and Air Force doctrine are suitable for this paper. In chapter 4, this paper analyzes the ability of the Army's aviation to meet the standards of the joint and Air Force doctrinal definitions of strategic air war, including the Warden view of strategic targeting. Additionally, EBO, which is a relatively new concept, is an important analytical tool. EBO provides a good method for bridging different service views on strategic war and resolving differences in how to select appropriate targets for achieving strategic effects.

#### Defining Strategic Effects

This paper relies on the concepts described in literature that explain EBO to translate strategic objectives into effects and targets. Essentially, the body of literature agrees on the definition and purpose of EBO, but differs on which military systems (air, ground, or sea) are suitable for EBO applications. However, since EBO is an idea born from the process of developing an air campaign, most of EBO's ideas are easily applied to this research. While the idea of EBO is an evolving concept, the amount of literature, mostly in the form of research papers and journal articles, grows daily.

Major David Wainwright, Australian Regular Army, has gathered extensive research papers on the subject of joint EBO for his 2003 U.S. Army Command and General Staff College thesis "Should the Australian Army Adopt Effects Based Operations?" The majority of these works define EBO as a process tool for thinking, decision-making, and reasoning (U.S. Joint Forces Command 2001, ii). Some sources

view EBO as applicable only at the higher echelons of warfare (Cheek 2002, 1). Even if these current ideas and thoughts on EBO are restricted to strategic air warfare, they are well suited for this research because of its focus on the theater strategic level of war.

Colonel (retired) John Warden, USAF, outlined the earliest EBO ideas as they apply to strategic air warfare in his book, *The Air Campaign*. Warden argues that today, war efforts must be focused on enemy function and not destruction. He states, “we are successful when function stops regardless of physical damage” (Warden 1998, 150).

Warden’s ideas planted the seeds for further thought on EBO.

USAF Major General David Deptula has written or sponsored several articles, Air Force white papers, and seminars that argue for using EBO as a tool for developing an air campaign and in selecting weapons systems to wage strategic warfare. Deptula outlines the central idea of EBO in an ACC white paper. He states, “that affecting a specific target set in a particular manner may have functional, systematic and/or physiological effects well beyond those created through the simple destruction or degradation of the target set” (U.S. Department of the Air Force, Air Combat Command 2002, 9). Deptula’s ideas on EBO are supported by author Price T. Bingham, in his article in the spring 2002 edition of *Joint Force Quarterly*. Bingham compares EBO to *Blitzkrieg*, “with its emphasis on exploiting movement and human factors (fear, fatigue, and uncertainty) to achieve quick success in land operations. . . . It also uses a small portion of the overall force to achieve disproportionate effects” (2002, 52). Most of the current literature agrees with Deptula and Bingham’s views on EBO. EBO is essentially figuring out how to achieve a strategic victory against an enemy without waging the destructive type of air warfare described by Douhet or Mitchell. While there is not an extensive body of literature on this relatively

new topic, the concepts are thoroughly explained and in relative agreement. How the Army doctrinally uses its aviation assets is also thoroughly explained.

### Attack Aviation and Army Doctrine

The Army's doctrine, in the form of its current FM's, is very clear on how its aviation assets should be employed--tactically, not strategically. However, recent papers from the U.S. Army War College and the Naval War College suggest that not all Army officers agree with the current attack aviation doctrine. The authors of these papers, both Army officers, argue for an expanded role for Army aviation--one that includes integration into the larger air campaign.

Several Army FM's explain the doctrinal role that the Army assigns to its attack aviation assets. FM 1-100, *Army Aviation Operations* (26 February 1997), and FM 1-112 *Attack Helicopter Operations* (2 April 1997), outline how the Army employs its attack aviation. Both documents state that Army aviation operates in the ground regime and it is not the air component for the U.S. Army. Additionally, Army aviation is "comprised of soldiers, not airman" (U.S. Department of the Army 1997, 1-3). None of the roles assigned to attack helicopter battalions in FM 1-112 include strategic attack or interdiction (U.S. Department of the Army 1997, 1-3). Army doctrine does not assign a strategic mission to its attack aviation.

FM 6-20-10, *The Targeting Process* (8 May 1996), details how the Army integrates its aviation into a targeting plan. According to this FM, the Army focuses its targeting process on enemy and friendly possible courses of action (U.S. Department of the Army 1996, 2-3). From these courses of action, the commander's staff selects high-priority targets for aviation or artillery strikes. The process does not include a strategic

evaluation of the enemy, but instead focuses on tactical enemy systems. The Army's targeting doctrine is understandable, however. Many Army aviation historians agree that it is a relatively new mission for the Army to conduct operations across the forward line of troops (Allen 1993, 37). Historians justify Army attack aviation's focus because it evolved in response to "the Army's fixation on Soviet tanks" (Bradin 1994, 92). Despite this focus on armor threats, not all sources of literature agree with the Army's current aviation doctrine. Some authors make a case for bringing the Army's aviation assets in line with the fixed-wing assets of the other military services.

Two recent papers, by Major Thomas R. Drew, USA, a student at the Naval War College, and Lieutenant Colonel David L. Lawrence, USA, a student at the Army War College, argue against the Army's current aviation doctrine. Both papers offer reasons for the Army to view its aviation assets as elements of airpower and not solely as maneuver elements. Additionally, both authors argue for including Army aviation as a source of airpower to a JFACC. Only by assigning Army aviation to the JFACC (when appropriate), they state, can the Army's aviation assets reach their full potential (Lawrence 2000, 17). Drew and Lawrence offer a perspective useful in answering this paper's research questions.

Literature that explains the historical perspective of the Army's current aviation doctrine, that explains its current doctrine, and that debates that doctrine, is extensive. The Army's aviation and targeting doctrine emphasizes a tactical role for its attack aviation assets and does not suggest a strategic capability. However, Army officers such as Drew and Lawrence question the Army's traditional attack aviation role. While the literature outlining the doctrinal role for the Army's attack aviation is plentiful, the

literature detailing the capabilities and limitations of current Army weapons systems is not as extensive.

#### Weapons Capabilities and Limitations (AH-64D, OH-58D, and AGM-114)

Probably due to classification restrictions, little open-source literature is available on the specific destructive targeting capabilities of the Army's attack aviation. Therefore, this research used unclassified references for aircraft and weapons capabilities from the Jane's series of information books. Both *Jane's All the World's Aircraft 2001-2002* and *Jane's Air Launched Weapons 2001* provide sources of information for general weapons capabilities. Some additional information is available in articles, such as Captain Adam Lange's essay, "Getting the Most from a Lethal Missile System," in the January-February 1998 issue of *Armor* (Lange 1998, 25). Unfortunately, none of these sources were adequately detailed (usually only discussing anti-armor capabilities), to help answer the thesis question. To fill this gap in weaponeering and targeting information the methods of surrogate weaponeering and software data analysis were used. While weaponeering provided technical data, several well-documented historical examples also provided insight about the capabilities of the Army's attack aviation.

#### Historical Examples

Historical analyses of two recent Army aviation operations, Earnest Will (Persian Gulf actions in 1987) and Task Force Hawk (Kosovo operations in 1999), differ in availability and opinion. While there is not significant analytical or primary literature on the Army's role in Operation Earnest Will, available sources generally agree that the operation was a successful use of Army aviation that achieved the desired political objectives and strategic effects. Analyses and documented lessons-learned from Army

attack aviation operations in Task Force Hawk are plentiful, but with conclusions that are somewhat mixed and usually divided along service lines.

Most literature sources agree that the outcome of Operation Earnest Will was successful due in large part to Army attack aviation. The most concise historical record found of the Army's role in Earnest Will was, *Special Operations Forces in Operation Earnest Will/Prime Chance I*, by Dr. John Partin. In this detailed historical account, Partin concludes, "The success of SOF units [including Army aviation] was amply demonstrated by the three clashes with Iranian forces . . . after which Iran ceased nearly all aggression in the northern Persian Gulf" (1998, 119). Author David Crist agrees with Partin writing in his article, "Joint Special Operations in Support of Earnest Will," that the Army "succeeded in shutting down Iranian operations in the northern Gulf" (2001-2002, 22). The successes of Army aviation in support of Operation Earnest Will are well documented and undisputed. The strategic policy and events leading up to military operations in Operation Earnest Will are also well documented.

An article by Professor Bernard Reich from the Foreign Military Studies Office at Fort Leavenworth, Kansas, titled "The United States and the Persian Gulf in the Bush Administration," gives an outstanding historical perspective that explains U.S. policies that set the conditions for the Army's 1987 involvement in Operation Earnest Will. According to Reich, the strategic goals of military operations in the Persian Gulf during this time were a result of the Carter Doctrine, which made free passage in the Persian Gulf a vital interest of the United States (1991, 3). Other policy insights of the time are available from sources such as Caspar Weinberger's book, *Fighting for Peace: Seven Critical Years in the Pentagon*, and Michael Palmer's *On Course to Desert Storm: The*

*United States Navy and the Persian Gulf*. The literature on the Army's ability to achieve a strategic effect during Earnest Will with its attack aviation is in good agreement. That is not the case with the literature on Task Force Hawk.

Sources that analyze the results of Task Force Hawk differ in their conclusions, usually along service lines. General Wesley Clark, USA, argues in his book, *Waging Modern War*, that Milosevic surrendered due to a combination of factors including the threat of a ground invasion "with the strength of Task Force Hawk and the forces coming into KFOR" (2001, 405). Lt. Gen. John Hendrix, USA, commander of V Corps at the time of Operation Allied Force, agrees with Clark. In a speech at the Association of the United States Army's 1999 Defense Force and Symposium in Heidelberg, Germany, Hendrix stated, "The reason Slobodan Milosevic finally caved in--a primary reason--was the presence of U.S. Army ground forces in Albania" (Anderson 2002, 1). Not all sources agree with Clark and Hendrix, but the differences may be a result from a difference in perspective.

Clark and Hendrix, the respective theater and corps commanders for Task Force Hawk, viewed the operation as a precursor to ground operations. They probably regarded Task Force Hawk as successful because it opened the door for ground forces to deploy in support of Operation Allied Force. Prior to Task Force Hawk, any ground force involvement in Operation Allied Force was prohibited by the Clinton administration. However, other sources measure Task Force Hawk's success based on its contribution to the air campaign of Operation Allied Force and disagree with Clark and Hendrix's conclusions.

Arguing that the Army was not prepared to integrate its aviation assets into an air campaign, thereby causing Task Force Hawk's effectiveness to suffer, Benjamin Lambeth, in a February 2002 *Air Force Magazine* article titled, "Task Force Hawk," sites deployment problems, rising costs, interservice rivalry, and poor preparation as causes for Army attack aviation failures during Operation Allied Force (2002, 7). Other authors agree with Lambeth, including John Gordon in his *Joint Forces Quarterly* article, "The Operational Challenges of Task Force Hawk," and give a variety of perspectives on the successes and failures of Task Force Hawk. Additionally, an important primary source, former Defense Secretary William S. Cohen and General Henry H. Shelton's "Joint Statement on the Kosovo After Action Review" to the Senate Armed Services Committee, lists the strategic objectives of Operation Allied Force and outlines shortfalls in the Army's attack helicopter contribution to those objectives. Cohen and Shelton conclude their testimony stating that the challenges of extensive pre-mission training and of developing a plan for Apache integration into the air campaign were not overcome until after the operation had ended (U.S. Congress, Senate 1999, 14). Documents from both a General Accounting Office report and a Center for Army Lessons Learned Newsletter list extensive lessons learned from Task Force Hawk including those of training and interoperability given by Cohen and Shelton, supporting their testimony. In contrast to the views of Clark and Hendrix, most of literature agrees that the challenges of Task Force Hawk hindered Army attack aviation's ability to significantly contribute to the air campaign of Operation Allied Force. But, none of the literature rules out the possibility that Task Force Hawk may have had an indirect effect on the strategic outcome of Operation Allied Force.

The sources of information and scholarly works that apply to this research are plentiful. Only the area of weapons system capabilities, specifically for the AGM-114 Hellfire missile as applied to strategic targets, is lacking in available analytical material. But, that gap in knowledge is filled by software data analysis and surrogate weaponeering. There are some variations in opinion about the definitions of strategic targeting, about proper application of Army aviation doctrine, and about the effectiveness of Task Force Hawk, but these differences are not insurmountable for this research. Overall, there is an ample and balanced source of scholarly written material to answer the thesis question, “Can today’s Army attack aviation achieve strategic effects?”

## CHAPTER 3

### RESEARCH METHODOLOGY

The basic research design for this paper is to analyze weaponeering data and the outcomes of two recent Army attack aviation operations (Operation Earnest Will and Task Force Hawk), and apply current strategic concepts and doctrinal definitions to that data to answer the research question, “Can today’s Army attack aviation achieve strategic effects?” The model is a table of comparison listing strategic targets and Army attack aviation doctrinal and weapons capabilities. Sources of data for analysis include doctrine documents, weaponeering software, surrogate weaponeering techniques, interviews, and available historical literature.

Both equipment and doctrine are analyzed to determine the suitability of Army attack aviation for achieving theater strategic effects. Doctrinal definitions are from the most current joint, Army, and Air Force doctrine documents. Typical theater strategic objectives and targets were derived from the current doctrinal definitions of strategic air warfare and the concepts of EBO. After a “target list” was assembled, each target was analyzed using both computer software and surrogate weaponeering techniques to determine the destructive effects of a common Army aviation attack weapon--the AGM-114 Hellfire missile. The weaponeering results, combined with EBO ideas on target selection, supplied crucial data for answering the primary thesis question.

Central to this research is understanding the Army’s current aviation doctrine and the capabilities of current Army attack aviation assets, specifically the AH-64D, the OH-58D, and the AGM-114 Hellfire missile. Much of the data for this paper was easily

accessible, except for a gap in weaponeering and targeting information for the AGM-114 Hellfire missile as applied to strategic targets. To fill the gap in weaponeering and targeting information, the author teamed up with weaponeering expert Major Lee H. Marsh Jr., USAF, to model several strategic targets derived from doctrinal sources. Using the *Joint Munitions Effectiveness Manuals (JMEM)* and the *JMEM Air-to-Surface Weaponeering System (JAWS) Version 2.2*, several target sets were weaponeered against the AGM-114 Hellfire missile. When software weaponeering did not include certain types of targets, or if weaponeering results could not be included in the analysis due to classification restrictions, surrogate weaponeering techniques were used.

Surrogate weaponeering techniques essentially use target effects substitution in place of software analysis. This technique assumes that the effects of a weapon on one type of target will be similar on another target possessing similar characteristics. For example, if the AGM-114K Hellfire missile is known to achieve a single-shot kill on a T-80 tank without its reactive armor, then it can be assumed that the weapon would have the same effect on any metal object with the same characteristics of strength and thickness as that found on a T-80 tank (a metal bunker door, for example). The technique of surrogating is useful when analyzing non-standard targets such as the variety of chemical, biological, nuclear, or explosive systems that characterize weapons of mass destruction. While weaponeering provided technical data, qualitative weaponeering and employment data was obtained through interviews.

An interview was conducted with Lieutenant Colonel Andrew Nocks, USA, a tactics instructor at the U.S. Army Command and General Staff College at Fort Leavenworth, Kansas. Lieutenant Colonel Nocks is an Apache pilot with 400+ hours and

served in 3rd Army as a staff officer in the Deep Operations Coordination Cell during Operation Anaconda in Afghanistan. The author of this paper served as the inquirer and the primary recorder during note taking. Questions from the interview included how the Army trains its pilots to use the Hellfire, how a pilot would determine targets for a Hellfire missile, how a Deep Operations Coordination Cell would determine targets for a theater, and the advantages and disadvantages of using Army attack aviation in a theater strategic air war. Lieutenant Colonel Nocks was candid and forthright, but asked that he only be paraphrased, and not quoted. Several well-documented historical examples also provided qualitative insights about the capabilities of the Army's attack aviation.

To supplement data gathered from weaponeering and interviews, the outcomes of Operation Earnest Will and Task Force Hawk are used as case studies to provide a practical qualitative analysis. Information about these operations, as expressed in historical records, lessons-learned documents, and official statements to Congress, are used to compare the Army's "practices" with its "preaching." Essentially, analysis of these operations provides real-world examples of the effectiveness of Army attack aviation in a theater strategic role.

The basic research design for this paper is to derive a set of targets from current doctrine, weaponeer those targets, determine the Army's doctrinal responsibilities for those types of targets, and then compare the results with information from interviews and the outcomes of Operation Earnest Will and Task Force Hawk. The model for the research is a simple table of comparison listing strategic targets and Army attack aviation doctrinal and weapons capabilities. Data sources include doctrine documents, weaponeering software, surrogate weaponeering techniques, interviews, and available

historical literature. Using these sources of data and methods of analysis, the paper offers an answer to its primary question, “Can today’s Army attack aviation achieve strategic effects?”

## CHAPTER 4

### ANALYSIS

This chapter builds a table of comparison from the doctrinal definitions of strategic air warfare, EBO definitions, Army attack aviation doctrine and capabilities, and historical examples from Operation Earnest Will and Task Force Hawk. First, the definition of theater strategic air warfare is translated into tasks and targets. Then, the tasks and targets are matched to current Army attack aviation capabilities. Finally, historical examples are used to provide additional data. The table of comparison answers the thesis question, “Can today’s Army attack aviation achieve strategic effects?”

#### Defining Strategic Warfare

Before the strategic capabilities of the Army’s attack aviation can be analyzed, the concept of strategic air warfare must be defined. Defining the strategic level of warfare using today’s joint, Army, and Air Force doctrine is difficult since the services differ on how they depict the levels of war and how they match tasks to these levels of war. Joint doctrine separates each level of war, Army doctrine views the levels of war as linear and focuses on tactical tasks, and Air Force doctrine views the levels of war as subsets of strategic warfare and insists that its forces can perform simultaneously at every level. Despite the inconsistencies, joint doctrine provides a definition of strategic targets and tasks. Table 1 summarizes the theater strategic target types found in current joint doctrine.

Table 1. Doctrinal Theater Strategic Targets

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Key Manufacturing Systems
Sources of Raw Material
Critical Materials/Stockpiles
Power Systems
Transportation Systems
Communications Facilities
Concentration of Uncommitted Elements of Enemy Armed Forces
Key Agricultural Areas
Information Operations Systems
Weapons of Mass Destruction (WMD) Production, Infrastructure, and Delivery
Command, Control, Communications, and Information (C4I) Systems

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The targets listed in table 1 are partly derived from Joint Publication 1-02, *Department of Defense Dictionary of Military and Associated Terms*. Joint Publication 1-02 defines strategic air warfare as:

Air combat and supporting operations designed to effect, through the systematic application of force to a selected series of vital targets, the progressive destruction and disintegration of the enemy's war-making capacity to a point where the enemy no longer retains the ability or the will to wage war. Vital targets may include key manufacturing systems, sources of raw material, critical material, stockpiles, power systems, transportation systems, communication facilities, concentration of uncommitted elements of enemy armed forces, key agricultural areas, and other such target systems. (U.S. Department of Defense 2001, 415)

This joint definition translates an effect on the enemy into targets. Additionally, the definition does not require destruction of these targets, but only "effects" on these targets that, in-turn, cause the destruction of the enemy's war-making capacity and the enemy's ability or will to wage war. If the Army's attack aviation can have a decisive effect on these vital targets, then it must be capable of waging theater strategic warfare. In addition to the targets from Joint Publication 1-02, other target types listed in table 1 are from the definition of the strategic level of war--a definition that is shared by Chairman of the

Joint Chiefs of Staff Manual 3500.04B, the *Universal Joint Task List (UJTL)* and Joint Publication 1-02.

Both Joint Publication 1-02 and Chairman of the Joint Chiefs of Staff Manual 3500.04B, *UJTL*, define the strategic level of war as:

The level of war at which a nation, often as a member of a group of nations, determines national or multinational (alliance or coalition) security objectives and guidance, and develops and uses national resources to accomplish these objectives. (U.S. Department of Defense 2001, 415, and Chairman of the Joint Chiefs of Staff 1999, 2-4)

This definition of strategic war requires that any effort, military or otherwise, be in support of national-level security objectives and guidance. The military's ability to support national objectives is articulated in its task lists.

The *UJTL*, which is published to "provide a standardized tool for describing requirements for the planning conducting, assessing, and evaluating joint and multinational training" (Chairman of the Joint Chiefs of Staff 1999, 1), provides tasks for waging war at the strategic level. Strategic Task (ST) 3.1.1, "Select Strategic Targets in the Theater for Attack," is described as:

To evaluate each strategic target to determine if and when it should be attacked for optimum effect on enemy centers of gravity, strategic decisive points, and in conformance with the combatant commander's strategic concept and intent. Included here are the destruction and degradation of enemy IO means and WMD production, infrastructure, and delivery systems. (Chairman of the Joint Chiefs of Staff 1999, 2-189)

Table 1 includes the target types described in this task--information operations (IO) and weapons of mass destruction (WMD). Additionally, table 1 includes a target category from ST 3.2.1 "Conduct Attack on Theater Strategic Targets/Target Sets using Lethal Means:"

Paramount consideration must be given to how best to hold at risk what the enemy values most. The objective of such attacks may be to delay, disrupt or degrade enemy forces and to affect the enemy's will to fight for strategic results. Alternatively, the objective may be to damage or destroy critical facilities (including C4I and WMD targets) or to delay, disrupt or degrade critical tasks, achieving strategic results. Means may include surface and subsurface land and sea based joint and multinational theater systems and air and space forces (aircraft, missiles, helicopters, UAV, space vehicles). (Chairman of the Joint Chiefs of Staff 1999, 2-192)

Table 1 also includes command, control, communications, computers, and information (C4I) targets from this strategic task. Interestingly, the *UJTL* mentions that helicopters may be included as a means to achieve this strategic task. Neither the joint definition of strategic air warfare, nor the definition of the strategic level of war, excludes the Army's aviation from playing a strategic role. In fact, the *UJTL* seems to encourage the use of helicopters in theater strategic warfare. The Army's task list, however, takes a different view by rejecting any direct role in operational or strategic tasks stating, "Army tasks apply at the tactical level" (U.S. Department of the Army 2002, ix). This inconsistency between the *UJTL* and the Army's task list clouds the Army's ability to see its aviation assets as a contributor to strategic warfare.

While it initially appears that the Army does not acknowledge the full effects that its attack aviation can have on strategic warfare, joint doctrine does not exclude any service or platform from contributing to strategic tasks. In fact, joint definitions provide a list of strategic type targets, summarized in table 1, that are not restricted by weapon or platform. Additionally, the concepts of EBO, as applied to strategic effects, further develop the target list and provide more opportunities for tactical weapon systems to achieve strategic effects.

### Defining Strategic Effects

The target list in table 1 changes when the concepts of EBO are used to derive a definition for strategic effects. Using the concepts of EBO, strategic effects are defined as controlling the enemy's situation awareness and his ability to command and control based upon political and military theater objectives. Essentially, EBO is a concept that links strategic objectives to effects, and effects to tactical acts. The concept asserts that the effect of destroying a target is more important than the destruction of the target itself. Much of EBO process of target selection is an art and dependent on a thorough understanding of the enemy as a system. Table 2 is an example of how the art of defining theater strategic effects, choosing objectives, effects, causal links, and tactical acts may be applied to an enemy system. Table 2 is also the basis for further weapon system analysis for this chapter. The table is derived from the definition of strategic effects and illustrates how that definition can be applied to formulating theater objectives, effects, linkages, and tactical acts.

The ideas of Benjamin Lambeth significantly contribute to the structure and substance of table 2. Lambeth, a senior staff member at the RAND corporation, argues in his essay, "Control of the Air: The Future of Air Dominance and Offensive Strike," that the recent technological developments of airpower, specifically precision weapons, stealth, and battlespace awareness, change the concepts of strategic war (1999, 29). Prior to the maturation of these key technologies, Lambeth argues, air power was "strategically" employed against infrastructure targets, since that was the most effective use of the weapons and intelligence of the time to achieve the desired physical effect. Today, however, Lambeth states, modern air forces do not need to employ its forces

Table 2. Example Theater Strategic Objectives, Effects, Causal Links, Actions, and Strategic Targets

Theater Strategic Objectives	Desired Effect	Causal Links	Actions	Strategic Targets
Information Superiority	Disrupt execution of enemy commander's plan	-Sending orders -Receiving orders -Understanding orders	Insert false orders into system	Information Operations
			Destroy comm. nodes -satellite relays -telephone switching -transmission lines	-C4I Systems -Communications Systems
			Destroy electrical power networks -transformers -transmission lines	Power Systems
Air and Space Superiority	Prevent enemy air attacks on friendly forces	-Enemy aircraft takeoffs -Enemy surface-to-surface missile launches	Destroy aircraft prior to takeoff	Transportation Systems
			Destroy runways	Transportation Systems
			Destroy SCUD missiles prior to launch	Concentrations of Uncommitted Forces
			Destroy SCUD launchers	Concentrations of Uncommitted Forces
			Disrupt support facilities -fuel storage -maintenance facilities -key personnel	-Critical Materials -Stockpiles
Maneuver Superiority	Prevent offensive enemy land movement	-Transportation support systems -Transportation constraint systems	Destroy refueling systems -fuel storage -pumping stations -refueling vehicles	-Critical Materials -Stockpiles -Transportation Systems
			Disrupt repair stations -maintenance facilities -parts manufacturing	-Transportation Systems -Key Manufacturing
			Destroy key vehicles -trailer trucks	Transportation Systems
			Destroy bridges, tunnels, bypasses	Transportation Systems
Logistical Superiority	Disrupt food and water supply of fielded enemy forces	-Imports/Requests -Distribution -Processing -Production	Destroy shipment vehicles -ships/boats -trailer trucks	Transportation Systems
			Disrupt processing -personnel -power systems -machinery	-Key Manufacturing -Key Agriculture -Sources of Raw Material
Protection Superiority	Protect friendly forces from WMD	-Production -Import -Storage -Delivery Systems -Control Systems	Destroy production facilities -personnel -power systems -machinery	-WMD -Critical Materials
			Prevent imports -reconnaissance -monitor import traffic	Transportation Systems
			Destroy storage areas -warehouses -bunkers	Stockpiles
			Disrupt control systems -personnel -communications -power systems	C4I

simply to “inflict pain.” Instead, the term “strategic” does not refer to a specific delivery platform or target type, but rather to “decisive operational effects.”

Lambeth defines “strategic” as “‘going for the juggler,’ focusing on ends, and being ‘transformatory’ and ‘game-changing’ in nature” (1999, 29). Using Desert Storm as an example, Lambeth writes:

There was indeed a strategic focus to the air campaign against Saddam Hussein. Yet it had nothing to do with attacks on leadership or infrastructure. Rather, it had to do with destroying Iraq’s situation awareness and capacity for collective action from the outset, attaining prompt control of the air as a sine qua non for everything else that followed, and then seeing to it that deployed Iraqi armor, artillery, and infantry were denied any ability to undertake coordinated counteroffensive action against attacking allied ground forces. (1999, 30)

Lambeth essentially defines strategic effects as decisive and focused actions taken to effect the enemy’s situation awareness and his ability to command and control. All of the strategic targets listed in both table 1 and table 2 would have an effect on the enemy’s ability to see his adversary and conduct operations to spoil his adversary’s objectives. The process of choosing the strategic objectives needed to achieve theater strategic effects is explained by General David Deptula in his essay, “Effects-Based Operations: Change in the Nature of Warfare.”

In his essay, Deptula, one of the key air campaign planners of Operation Desert Storm, links strategic effects with theater objectives. He states that the complex process of planning for effects is very dependent on intelligence, available weapons systems, and weapons capabilities. Therefore, Deptula argues, “an effective plan must extract maximum impact from those systems--not in terms of absolute destruction of a list of targets, but in terms of effects desired upon target systems” (2001, 13). Intelligence and weapons planners must carefully choose the desired effects on selected target systems.

Deptula states that planners “must determine which effects on each enemy system can best contribute to the fulfillment of military and political objectives of the theater campaign. This depends upon the specific political and military objective” (2001, 13). Deptula argues that the theater objectives should be determined first, followed by detailed planning for desired strategic effects. Combining Deptula and Lambeth’s definition of strategic effects produces a new definition--decisive and focused actions taken to affect the enemy’s situation awareness and his ability to command and control *based upon political and military theater objectives*. This targeting approach that links the objective, an effect, and an action (target) is the same approach used by the Air Force’s ACC in planning a strategic air campaign.

In an ACC white paper titled, “Effects-Based Operations,” ACC explains that EBO methodology is only a refinement or “evolution” of objectives-based planning that has been a part of U.S. military planning for the last 20 years. Like EBO, objectives-based planning used the strategy-to-task approach for planning military operations (U.S. Air Force, Air Combat Command 2002, 4). The strategy-to-task approach referred to in the white paper is used to create the task lists found in today’s *UJTL*, *AUTL*, and *Air Force Task List*. The theater objectives in table 2 were derived from the theater strategic tasks listed in the *UJTL* (Chairman of the Joint Chiefs of Staff 1999, 2-5). The objective for information superiority in table 2 corresponds to theater ST 5 (provide theater strategic command, control, communications, and computers), the objectives for air and or space and maneuver superiority correspond with ST 3 (employ theater strategic firepower), the objective for logistics superiority corresponds with ST 4 (sustain theater forces), and the objective for protection superiority is derived from ST 6 (coordinate

theater force protection). ACC argues that EBO takes the objectives-based process a step further “allowing planners and commanders to examine conditions and causal linkages through which actions lead to objectives” (U.S. Air Force, Air Combat Command 2002, 5).

The EBO methodology outlined by ACC begins with an objective, determines the desired effects or conditions to achieve that objective, examines causal linkages to the effects, and then determines actions. Once a military campaign begins, the actions cause the effects, and the effects achieve the objectives. According to the white paper, the purpose of effects planning is give the planner an understanding of why a particular action may work in some cases, but not in others. More importantly, effects-based planning “highlights additional options” (U.S. Air Force, Air Combat Command 2002, 5). The causal linkages explain why planners chose a particular action and how it will cause the desired effect. The goal of ACC’s EBO methodology, as articulated by Deptula and Lambeth, is to take advantage of technologies unique to airpower while avoiding a Douhet or Mitchell style of destructive warfare. Using EBO, a planner can maximize the strategic effect of a weapons system through careful enemy system analysis. Table 2 attempts to present an example of EBO methodology using both original ideas and illustrations from literature.

As discussed earlier, the theater objectives in table 2 were derived from the theater strategic tasks from the *UJTL*. After determining example theater objectives, typical desired effects were developed. The ACC white paper sites an EBO process using the objectives of information superiority, maneuver dominance, freedom of navigation, and aerospace superiority (U.S. Air Force, Air Combat Command 2002, 6). These

objectives can be defined as a set of conditions, or effects, that U.S. forces desire to create in virtually all operations. Destruction or damage of enemy command and control networks, ACC states, has historically contributed to information superiority. Key linkages between this act and the desired effect (disrupting the enemy commander's plans) may be the enemy's inability to receive, communicate, or understand a commander's orders. In summary, destruction of a satellite relay station (an act) prevents sending orders (causal link), which disrupts an enemy's plan (effect), and contributes to theater information superiority (objective). Price Bingham provides a similar example and causal link analysis with enemy transportation systems.

Price Bingham, a former chief of the Current Doctrine Division in the Airpower Research Institute at the College of Aerospace Doctrine, Research, and Education uses EBO to suggest a method to quickly defeat land forces by avoiding attrition-orientated targeting. Bingham argues that "today, all armies posing a major threat of aggression depend on vehicles to move units to the battlefield as well as on the battlefield--even the Taliban forces in Afghanistan" (2002, 53). Bingham sites examples from Normandy to Kosovo where air attacks were used to destroy relatively few vehicles, but those attacks convinced enemy soldiers that vehicular movement, or even manning a stationary vehicle, was perilous. Bingham argues for aggressive real-time surveillance, moving target indicators, and data link enhancements on every weapon system from a F-15E to a Longbow Apache to enhance targeting of key vehicular traffic (2002, 58). Bingham's ideas are used in table 2 as an example of supporting the objective of maneuver superiority. A desired effect supporting this objective may be to prevent offensive enemy ground movement. Causal linkages would be transportation support systems and

transportation constraint systems. A few acts to achieve the desired effect may be destruction of refueling system, repair systems, key vehicles that carry out these functions, or the destruction of roads, bridges, and tunnels used by these vehicles. Essentially, Bingham provides a causal link or nodal analysis for the objective of maneuver superiority. With detailed analysis, EBO methods can enable any weapon platform to achieve strategic effects.

Using the concepts of EBO, strategic effects are defined as controlling the enemy's situation awareness and his ability to command and control based upon political and military theater objectives. From this definition, table 1's strategic targets were integrated into example theater strategic objectives derived from the *UJTL*. Additionally, effects, linkages, and acts were added from literature examples to transform table 1 into table 2. Each act listed in table 2 matches a doctrinally derived strategic target. Next, Army attack aviation doctrine and weapons capabilities are matched to the acts (targets) in table 2 to answer the research question, "Can today's Army attack aviation achieve strategic effects?"

#### Attack Aviation and Army Doctrine

The Army's current doctrine is fairly clear on the role its attack aviation--its purpose is to tactically support ground campaigns, not to conduct strategic air campaigns. Few of the targets in table 2 are doctrinally correct for Army attack aviation. The role the Army assigns to its attack aviation is understandable, however, given the history and development of the Army's aviation arm that includes bitter confrontations with the Air Force over roles, missions, research, and development (U.S. Department of the Army 1997, G-1). Despite the tactical doctrinal role currently assigned to its attack aviation,

new missions and roles are developing that could expand the role of the Army's aviation branch beyond just tactical support of ground forces.

The Army views not only its aviation as a tactical asset, but all of its functions as tactical tasks. FM 7-15, *Army Universal Task List (AUTL)*, states, "Army tactical tasks apply at the tactical level of war," and "FM 7-15 applies to commanders and trainers at all tactical echelons and to doctrine, combat, and training developers who develop doctrine, tactics, techniques, and procedures for the tactical level of war" (2002, x). The Army infers that its forces can accomplish only tactical tasks, and only through vertical linkage with *UJTL* operational tasks, can strategic effects be achieved. The Air Force, conversely, takes an entirely different view of its aviation capabilities.

In AFDD 1-1, *Air Force Task List*, the Air Force boldly states that the *UJTL* structure "implies a restriction to the Service's task lists to a position under its tactical level of war tasks" (U.S. Department of the Air Force 1998, 5). The Air Force further argues that since aerospace forces operate at all levels of war that its task list is arranged to recognize aerospace power as "the strategic instrument of power that it is" (U.S. Department of the Air Force 1998, 6). AFDD 1-1 further declares:

Aerospace power uses lethal and nonlethal means to create strategic, operational, and tactical effects in order to achieve objectives. The nature of operations that can mold the strategic, operational, and tactical environments with the same activity are difficult to divide by level of war. (U.S. Department of the Air Force 1998, 7)

The Air Force's argument is compelling--are the characteristics of airpower, including rotary attack aviation, unique enough to not be classified solely as tactical platforms? Army doctrine does not recognize its aviation assets as that unique.

The Army lists six aviation principles in FM 1-100, *Army Aviation Operations*. The first principle is “Aviation operates in the ground regime” (U.S. Department of the Army 1997, 1-3). This “cardinal principle,” FM 1-100 states, “defines aviation’s role as an element of landpower. Aviation is a component of the combined arms team, not the air component of the U.S. Army” (1997, 1-3). FM 1-100 further states, “Aviation is comprised of soldiers, not airman” (1997, 1-3). To support this strong link between its aviation and ground forces, the Army classifies its rotary aviation as a “maneuver” force—the same classification given to its armor and infantry fighting vehicles (U.S. Department of the Army 2002, 3-6). This strong insistence of tying the Army’s aviation to its ground forces begins to soften, however in its attack aviation manual, FM 1-112, *Attack Helicopter Operations*.

FM 1-112 lists several options for a commander to use attack aviation. These options include: to attack massed armored or light forces, to attack in depth to extend the influence of the force, to dominate avenues of approach, to conduct reconnaissance, and to perform search and attack missions (U.S. Department of the Army 1997, 1-3). While this list does not include strategic attack or interdiction, it does offer a “search and attack” mission that implies independent operations.

Despite stating “Destroying the enemy’s fighting force is the only sure way of winning any future conflict” (U.S. Department of the Army 1997, 1-3), FM 1-112 details two missions in its appendices that suggest independent aviation operations beyond the forward line of troops that are not in direct support of ground forces. The first mission is deep operations by Kiowa Warrior attack helicopter battalions. FM 1-112 concludes that deep attacks to “destroy armored and other forces are feasible mission for [Kiowa

Warrior attack helicopter battalions]” (U.S. Department of the Army 1997, H-2). The second mission, theater missile defense--search and attack, is suggested based on lessons learned from an advanced warfighting experiment, Roving Sands 1995. In this exercise an AH-64A attack helicopter battalion executed several live theater missile defense attack missions. The exercise focused on the process of finding and destroying the transporter-erector-launchers (TEL) of an enemy theater ballistic missile (TBM) system before the TBM could be launched. The results of the exercise were positive. The results even suggested that a more successful strategy would be to attack the TBM’s reload sites where the original TEL, other TELs, TBMs, and TBM personnel could be easily destroyed (U.S. Department of the Army 1997, I-6). With the success of exercises such as Roving Sands 1995 and other operations, the idea of expanding the role of the Army’s attack aviation is gaining support. Some contemporary Army officers advocate new roles for Army aviation in interviews and recent papers from the Army War College.

Lieutenant Colonel Nocks, a 400 hour AH-64A Apache pilot and a 3rd Army Deep Operations Coordination Cell planner during Operation Enduring Freedom, stated in an interview that deep Army attack aviation operations outside the designed role of anti-armor, are a continuously evolving concept (Nocks, 2002). However, he stated a personal opinion that the Army aviation community is more than willing to adopt new roles, based on risk analysis, to support a theater commander’s objectives. As an example of this type of support, Lieutenant Colonel Nocks cited an AH-64A unit’s mission during the first night of the air campaign in Desert Storm. For this mission, AH-64As were used to target Iraqi early warning radars to clear an air corridor for fixed-wing coalition aircraft. Destroying radars was clearly a nontraditional mission, but it was successfully

executed. He added that with its strengths of finding hidden targets, reconnaissance, and real-time battle damage assessment, the Army's attack aviation would probably play a more active role at the joint theater level. Other Army officers agree with Lieutenant Colonel Nocks.

Lieutenant Colonel David Lawrence argues in his paper, "Army Aviation as an Element of Airpower," prepared for the Army War College in 2000, that to support the transforming Army and to ensure its future relevance, the Army must change its attack helicopter force structure, training, and doctrine so that aviation assets can be better employed in joint operations. Lawrence cites military operations in Kosovo during Operation Allied Force as an example of a "missed opportunity" for the Army to integrate its aviation into a joint air campaign (Lawrence 2000, 5). Because the Army insisted in traditional Corps control through a land component commander (which did not exist in Operation Allied Force), the Army's aviation contribution was not timely and therefore irrelevant. The Army gets it right, Lawrence states, with the 6th Cavalry Brigade in Korea that routinely performs maritime interdiction under the control of the naval component (Lawrence 2000, 12). Only through doctrinal, organizational, training, and leadership changes, Lawrence concludes, can the Army's attack aviation prove to be "relevant to our nation and a flexible member of the airpower team" (Lawrence 200, 17).

The Army takes a hard-line on the tactical role of its attack aviation, but that hard-line is beginning to crack. Army officers citing examples of past and current failures and successes foresee an expanding role for the Army's aviation assets. While the Army states that the mission of its aviation is tactical in purpose, it is becoming apparent that its aviation is capable of being strategic in effect. Despite the doctrinal restrictions the Army

places on its aviation, the capabilities of its aviation weapons systems are without bounds.

#### Weapons Capabilities and Limitations (AH-64D, OH-58D, and AGM-114)

Various unclassified sources detail the characteristics and limitations of the Army's primary aviation attack platform, the AH-64D Apache, and its primary armed observation helicopter, the OH-58D Kiowa Warrior. Both these platforms use the AGM-114 Hellfire missile, which provides a precision capability against a variety of targets. The ability of these platforms to affect the targets in table 2 can be assessed using unclassified sources.

The AH-64D Apache is an upgraded version of the AH-64A, which was first delivered in 1984. This new version of the Apache includes the Longbow radar with an air-to-air and air-to-ground mode that can track targets through rain, fog, and smoke that can defeat the Apache's forward looking infrared (FLIR) and television weapons guidance systems (Jackson 2001, 595). Similarly, the OH-58D Kiowa Warrior has been improved from its original 1983 configuration into a Prime Chance version for Operation Earnest Will/Prime Chance II and into an OH-58D (I) low-observable version (Jackson 2001, 568). Upgrades to the OH-58D included improved sensors, firing clearance for Stinger and Hellfire missiles, and an updated radio system. Table 3 summarizes the characteristics of these two platforms listed in FM 1-112 (U.S. Department of the Army 1997, A-1 and D-5).

In addition to these characteristics, FM 1-112 lists several others including advanced navigation capabilities, and in the case of the AH-64D, an ability to record selected video for battle damage assessment and reconnaissance (U.S. Department of the

Table 3. Army Attack Helicopter Characteristics

Weapon System	Normal Cruise Speed	Typical Combat Range	Max Armament Loads	Target Acquisition Capability	Number per Airlift Aircraft
AH-64D	100-120 knots	150 km	16 Hellfire 76 Rockets 1200 rounds 30mm	Day TV FLIR Direct View Optics Laser Range Finder and Designator	C-5: 6 C-141: 2
OH-58D	100 knots	120 km	4 Hellfire 14 Rockets 500 rounds .50 caliber	Laser Range Finder and Designator Airborne Target Handover System	C-5: 22 C-141: 8

Army 1997, A-3). Despite the advantages of a diverse weapons mix, deployability (almost an entire attack battalion of OH-58Ds can fit in a single C-5), real-time battle damage assessment, and precision-guided weapons, both systems have some disadvantages.

An important disadvantage of the Army's attack aviation platforms is a limited ability to operate in very low cloud ceiling and visibility weather. FM 1-112 states:

Although fully capable of operating in marginal weather, attack helicopter capabilities are seriously degraded in conditions below a 500-foot ceiling and visibility less than 3 km. Because of the Hellfire missile's trajectory, ceilings below 500 feet require the attack aircraft to get too close to the intended target to avoid missile loss. Below 3 km visibility, the attack aircraft is vulnerable to enemy [air defenses]. (U.S. Department of the Army 1997, 1-18)

In addition to weather, limitations in range (see table 3) and speed cause Army attack aviation to be more vulnerable to enemy air defenses than faster fixed-wing aircraft. In his interview, Lieutenant Colonel Nocks listed survivability and range as potential weaknesses in using attack aviation for strategic effects against strategic targets (Nocks 2002). However, he also stated that the ability to find hidden targets and to conduct real-

time target damage assessment is unique strengths. Both of these strengths are an indirect result of capabilities derived from the Hellfire missile system.

A key strength of the Army's attack aviation systems is the ability to employ the precision Hellfire laser guided missile "capable of defeating any known armor" (U.S. Department of the Army 1997, A-4). The Hellfire missile has seven variants with different warheads and guidance systems. Hellfire guidance systems require precision acquisition and firing capabilities based on television, optical, infrared, or laser sensors. With such a variety of sensors, the Army's attack aviation can uniquely observe, engage, and assess a target without receiving inputs from other intelligence sensors. The characteristics of these variants are detailed in Captain Adam Lange's article for *Armor* magazine, "Hellfire: Getting the Most from a Lethal Weapon System," (1998, 26) and in *Jane's Air-Launched Weapons 2001* (Lennox 2001, 245). Table 4 summarizes the specifications and optimum target types for Hellfire variants from these sources.

In addition to these unclassified characteristics, classified Hellfire capabilities are available using weaponeering software (U.S. Department of the Air Force 2002, *Joint Munitions Effectiveness Manual: Air-to-Surface with JMEM/AS (JAWS Version 2.2)*). The *JMEM/AS* software allows the user to determine AGM-114 effectiveness against several target types, but its statistical results are classified. For this reason, only the data in table 4 and unclassified surrogate targeting techniques were used to measure Hellfire effectiveness against strategic targets.

The weapons characteristics from table 4 can be compared to the theater strategic targets and actions from table 2. Table 5 shows the extent of the Army's attack aviation capabilities and their effect on selected theater strategic targets. Targets where specific

Table 4. AGM-114 Hellfire Specifications and Designed Targets

Specifications	AGM-114 A/B/C	AGM-114F	AGM-114K (Hellfire 2)	AGM-114L (Longbow Hellfire 2)	AGM-114M (Hellfire 2/RBS-17)
Warhead	8 kg high explosive shaped charge	Tandem high explosive anti-tank charge	High explosive shaped charge	Tandem high explosive anti-tank charge	12.5 kg high explosive fragmentation charge
Fuse	Impact	Impact	Impact	Impact	Impact
Guidance	Semi-active laser	Semi-active laser	Semi-active laser	Inertial and radar	Semi-active laser
Range	8 km	8 km	9 km	9 km	9 km
Targets	Anti-armor Tanks Bunkers Structures Vehicles Radar sites Antenna arrays Comm. equipment Small buildings Towers Boats	Anti-armor Reactive armor	Anti-armor Tanks Bunkers Structures Vehicles Aircraft Radar sites Antenna arrays Comm. equipment Small buildings Towers Boats	Anti-armor Reactive armor Anti-ship Landing craft Small warships	Anti-ship Landing craft Small warships

effects information is not available are listed as “UNKNOWN.” Other targets that were not specifically listed in table 4, but have characteristics similar to a surrogate target, are listed as “YES” with the surrogate target type. Surrogate weaponeering techniques essentially use target effects substitution in place of software analysis. This technique assumes that the effects of a weapon on one type of target will be similar on another target possessing similar characteristics. Table 5 shows that the majority of the example theater strategic targets derived from the joint doctrine definition of strategic war, the objectives listed in the *UJTL*, and the ideas of EBO are vulnerable to attack by the Army’s attack aviation assets.

Table 5. Comparing Strategic Targets and Army Attack Aviation Capabilities

Theater Strategic Objectives	Strategic Targets	Actions	Army Aviation Capable Targets
Information Superiority	Information Operations	Insert false orders into system	NO (However, attack aviation could be employed as a deception)
	-C4I Systems -Communications Systems	Destroy communication nodes -satellite relays -telephone switching -transmission lines	YES
	Power Systems	Destroy electrical power networks -transformers -transmission lines	YES
Air and Space Superiority	Transportation Systems	Destroy aircraft prior to takeoff	YES
	Transportation Systems	Destroy runways	UNKNOWN
	Concentrations of Uncommitted Forces	Destroy SCUD missiles prior to launch	YES (surrogate with aircraft)
	Concentrations of Uncommitted Forces	Destroy SCUD launchers	YES (surrogate with vehicles)
	-Critical Materials -Stockpiles	Disrupt support facilities -fuel storage -maintenance facilities -key personnel	YES (surrogate with small buildings)
Maneuver Superiority	-Critical Materials -Stockpiles -Transportation Systems	Destroy refueling systems -fuel storage -pumping stations -refueling vehicles	YES (surrogate with small buildings)
	-Transportation Systems -Key Manufacturing	Disrupt repair stations -maintenance facilities -parts manufacturing	YES (surrogate with small buildings)
	Transportation Systems	Destroy key vehicles -trailer trucks	YES
	Transportation Systems	Destroy bridges, tunnels, bypasses	UNKNOWN
Logistical Superiority	Transportation Systems	Destroy shipment vehicles -ships/boats -trailer trucks	YES
	-Key Manufacturing -Key Agriculture -Sources of Raw Material	Disrupt processing -personnel -power systems -machinery	YES (surrogate with small buildings)
Protection Superiority	-WMD -Critical Materials	Destroy production facilities -personnel -power systems -machinery	YES
	Transportation Systems	Prevent imports -reconnaissance -monitor import traffic	YES
	Stockpiles	Destroy storage areas -warehouses -bunkers	YES
	C4I	Disrupt control systems -personnel -communications	YES

The Army's attack aviation, despite differences in doctrine and practice, or weaknesses in weather capability, range, and enemy air defense vulnerability, possess characteristics that enable it to have an effect on theater strategic war. Many of the "weaknesses" are situational--range may not be a factor in a small country or area of operations, or weather may not be a factor in a desert environment. In fact, its strengths of precision engagement with Hellfire missiles, the ability to find hidden targets using a wide variety of sensors, and the capability for real-time target damage assessment, make the Army's attack aviation ideal for some theater strategic tasks. Properly employed in support of a theater commander's objectives, Army attack aviation is capable of having theater strategic effects acting as an independent weapon system. Two historical examples provide additional evidence for this assertion.

#### Historical Examples

Two historical cases provide examples where the Army stretched traditional doctrine and chose to employ its aviation assets strategically in support of a naval campaign (Operation Earnest Will) and an air campaign (Operation Allied Force). Army attack aviation contributed assets to both these operations but with differing effect. During Operation Earnest Will (1987-1989), the Army's role came in the form of two attack aviation deployments in support of U.S. naval escort operations in the Persian Gulf. The first deployment, Prime Chance I, consisted of Army special operations aviation assets. The second, Prime Chance II, involved a replacement regular Army aviation unit. Because of superior training, a quick deployment, and effective integrated joint operations, both operations were successful. The Army's chief contribution in 1999 to Operation Allied Force, a North Atlantic Treaty Organization (NATO) operation to

free Kosovo from Serbian occupation, was the combined forces of Task Force Hawk. Whether or not the Army's aviation assets, as a part of Task Force Hawk, were able to strategically affect the outcome of the operation, is still debatable. Difficulties in deployment, integration, and training somewhat hampered effective contributions to the campaign. Despite the differences in results, both operations suggest that the Army's attack aviation can operate strategically.

Operation Earnest Will began during the Iran-Iraq war fought in the 1980's. As the war between the two countries slowed to a stalemate, both sides began to seek an edge by attacking each other's economic source of income--oil. Iran became convinced that Saudi Arabia and Kuwait were supporting the Iraqi war effort and in 1986 began using naval mines, small attack boats, and Silkworm missiles to destroy and harass neutral shipping passing through the Persian Gulf (Partin 1998, 5). Iran's attempt to prevent the free passage of shipping through the Gulf violated the U.S.'s stated political policy for the Middle East. President Carter articulated U.S. strategic policy, called the Carter doctrine, for the region in his 1980 State of the Union Message:

Let our position be absolutely clear: An attempt by any outside force to gain control of the Persian Gulf region will be regarded as an assault on the vital interests of the United States of America, and such an assault will be repelled by any means necessary, including military force. (Reich 1991, 3)

President Reagan reinforced U.S. strategic objectives for the area by creating United States Central Command in 1983, authorizing the "reflagging" of Kuwaiti oil tankers in December of 1986, and then providing them with U.S. naval protection in July 1987. U.S. Naval protection came in the form of escort missions. However, during the first escort mission, the oil tanker *Bridgeton* struck an Iranian mine. Since the presence of U.S. ships

alone did not deter Iranian aggression, the U.S. began a more robust response. To counter the Iranian mine and small boat threat, the U.S. deployed helicopters and small specialized ships augmented with navy special forces SEAL teams to the region (Partin 1998, 11). The first attack helicopters to the region were the Army's rocket and mini-gun equipped AH-6s (and its observation variant, the MH-6) from TF-160.

TF-160 was an Army aviation unit specifically designed to support special operations. Formed in 1981, the unit was equipped with the small, quiet MH/AH-6 and its pilots were specially trained for flying from ships and operating at night using night vision goggles and FLIR sensors (Partin 1998, 14). On 4 August 1987, after a short successful rehearsal off the coast of Virginia, two MH-6s, four AH-6s, thirty-nine personnel, and six maintenance pallets from TF-160 deployed from Fort Campbell, Kentucky, on a single C-5 aircraft (Partin 1998, 18). This aviation detachment became DET 160 AVGP and was declared operational in theater after only two days.

Flying from navy ships in small formations called SEABAT teams, the MH/AH-6s conducted night patrols to search for Iranian mines and to find small Iranian attack boats (Crist 2001-2002, 16). By September, Iranian activity in the area became more aggressive, resulting in a strategy shift from observation to offensive attack operations. During the next few months, SEABAT teams were successful in attacking Iranian mine-laying ships, supporting SEAL team boarding operations, destroying Iranian fast attack boats, and even conducting combat search and rescue operations (Partin 1998, 115). A four man Administrative Logistics Support Unit based in Bahrain handled logistics by processing replacement personnel and equipment for the detachment (Partin 1998, 93). However, the demands of Operation Earnest Will eventually drained DET 160 AVGP's

resources. In February 1988, the Army deployed OH-58D from the 118th Aviation Battalion as a replacement unit for DET 160. This new force was dubbed Prime Chance II.

The OH-58Ds of the 118th Aviation Battalion had several advantages over the MH/AH-6s. These advantages included a greater FLIR sensor capability, auto-focusing infrared thermal imaging sensors, and laser range finders and designators for Hellfire missiles. While not as small or as quiet as the MH/AH-6s, the OH-58D also had a greater firepower capability (Crist 2001-2002, 21). From February to July 1988, the OH-58Ds responded successfully to several Iranian attacks. The last significant operation occurred on 12 July 1988, when two OH-58Ds destroyed an Iranian patrol boat that was attacking a Panamanian tanker (Crist 2001-2002, 21). By August 1988, Iran ended its unsuccessful “Tanker War” one month after accepting a United Nations cease-fire with Iraq. Summing up the operation, Dr. John W. Partin states in his history of Operation Earnest Will, “the United States had succeeded in preventing an Iranian economic blockade of Kuwait” (Partin 1998, 114).

The success of Operation Earnest Will was due in large part to the non-traditional use of Army attack aviation. It is not a doctrinal mission for Army aviation to employ from USN ships and conduct missions preventing a hostile force from controlling Persian Gulf shipping. But, as the successes of Operation Earnest Will illustrate, conducting operations that allow strategic freedom of navigation, is certainly an Army aviation capability. There is a direct link between the strategic objectives outlined by the Carter doctrine and the contributions of the Army’s attack aviation in keeping the Persian Gulf open. Utilizing superior training and equipment, quickly deploying on a single C-5,

integrating into naval operations, and capitalizing on superior nighttime reconnaissance and precision attack capabilities, Army aviation achieved a strategic effect in the Persian Gulf during Operation Earnest Will. While trying to duplicate this effect, the Army's attack aviation was not as clearly successful during Operation Allied Force.

As Secretary of Defense William Cohen and General Henry Shelton stated in their 1999 testimony to the Senate Armed Services Committee on Operation Allied Force, "The campaign over Kosovo was not a traditional military conflict" (U.S. Congress 1999, 4). Responding to Serbian military atrocities ordered by Serbian President Milosevic against the province of Kosovo, NATO began Operation Allied Force in 1999. NATO set the following strategic objectives for its use of force in Kosovo:

Demonstrate the seriousness of NATO's opposition to Belgrade's aggression in the Balkans; deter Milosevic from continuing and escalating his attacks on helpless civilians and create conditions to reverse his ethnic cleansing; and damage Serbia's capacity to wage war against Kosovo in the future or spread the war to neighbors by diminishing or degrading its ability to wage military operations. (U.S. Congress 1999, 4)

Since NATO members debated their level of vital interest in Kosovo, it was decided early in the planning stage to not use ground forces in the operation (Gordon 2001-2002, 53). However, facing dug-in Serbian police and military forces that spread themselves throughout the forested and hilly terrain, General Wesley Clark, the Commander-in-Chief of European Command, and overall commander for Operation Allied Force, considered an option to use attack helicopters (Gordon 2001-2002, 53).

Using attack aviation to destroy fielded military forces was not a new tactical mission for Army aviation. However, the theater strategic integration of Army aviation into an air campaign was a relatively new operational concept. In a March 2001 report to

the House of Representatives Chairman of the Armed Services Committee, the

Government Accounting Office stated:

During Operation Allied Force, Task Force Hawk's mission was to use its Apache helicopters to conduct deep attacks against Serbian forces in Kosovo. Military officials consider the task force and its mission consistent with doctrine, but not typical in that the task force was supporting an air campaign rather than its more traditional role of being used in conjunction with Army ground forces to engage massed formations of enemy armor. According to Army officials, the Task Force Hawk mission was not something the Army routinely trains for. (U.S. General Accounting Office 2001, 3)

Despite the potential training shortfalls, Clark pressed for Task Force Hawk and won Presidential approval over the Chairman of the Joint Chiefs of Staff General Shelton's objections (Clark 2001, 233). But, the challenges for the task force had already begun.

Originally planned as a 24 Apache and 1,700 person troop deployment, Task Force Hawk grew in size. When Macedonia refused to accept the military forces of Task Force Hawk, the deployment was shifted to Albania. Because of the lack of facilities and perceived instability of the new host nation, the Army required additional engineering and force protection forces (U.S. General Accounting Office 2001, 4). The force grew to twenty-four Apaches, twenty-six UH-60 and CH-47D helicopters, a Multiple Launch Rocket System platoon with three Multiple Launch Rocket System vehicles, a light infantry company, an anti-tank company with thirty-eight armed vehicles, military police and intelligence platoons, fourteen Bradley armored fighting vehicles, fifteen M1A2 tanks, eight 155 millimeter Howitzers, and an air defense battery. To support 24 attack helicopters, the Army deployed 5,350 personnel (Lambeth 2002, 2). Task Force Hawk began deploying from its bases in Germany on 8 April 1999, and was declared fully

ready for operations on 7 May--nearly one month from the deployment start date and only one month before the end of the conflict on 10 June (Gordon 2001-2002, 54).

The long deployment time also created problems in training. Obviously, the longer a unit takes to deploy, the shorter the available time for training at the deployed location. The Center for Army Lessons Learned lists several training lessons learned for the Apaches of Task Force Hawk. Some of these include, conducting an environmental review for flight conditions prior to deploying and practicing with these conditions in simulators, training for external fuel tank operations at high gross weights, and configuring Apaches to achieve the desired effect based on assigned target (Center for Army Lessons Learned 2001, 10). After arriving in Albania and conducting training flights to solve some of these problems, two Apaches crashed and two pilots were killed. These crashes further dampened Washington's support for helicopter operations (Gordon 2001-2002, 56). As a result of deployment and training delays, the AH-64s of Task Force Hawk were never employed as part of the air campaign.

Despite the difficulties of deploying and training that prevented any measurable contribution to the NATO air campaign, it is possible that the Apaches of Task Force Hawk contributed to the strategic outcome of Operation Allied Force. In their testimony, Cohen and Shelton list the buildup of NATO ground combat power in the region, including Task Force Hawk, as one of five reasons for Milosevic's acquiescence. Additionally, author John Gordan, a RAND defense analyst argues that "the leadership in Belgrade probably viewed [Task Force Hawk] and the NATO ground forces in Macedonia as the nucleus of an eventual ground attack into Kosovo" (Gordon 2001-2002, 56). Without personally asking Milosevic, these assertions cannot be proven, but it

is possible that Task Force Hawk indirectly contributed to the strategic objectives of Operation Allied Force without firing a shot. Certainly the principles of EBO would suggest this possibility.

The strategic objectives of both Operation Earnest Will and Operation Allied Force were eventually achieved. The direct contributions of the Army's attack aviation to these objectives were somewhat mixed. A direct link can be drawn from the actions of armed Army helicopters in the Persian Gulf in support of Earnest Will to the favorable strategic outcome of that operation. The link between the strategic objectives of Operation Allied Force and Army attack aviation contributions is somewhat debatable or indirect at best. Despite the differences, both operations provide a case for using the Army's attack aviation in a non-traditional way to achieve a favorable strategic end.

Using a table of comparison from the doctrinal definitions of strategic air warfare, EBO definitions, Army attack aviation doctrine and capabilities, plus historical examples from Operation Earnest Will and Task Force Hawk, it is clear that by ignoring doctrinal traditions, the Army's attack aviation can achieve strategic effects. When properly trained and employed against targets with causal links to theater strategic targets, Army attack aviation can be instrumental in achieving a theater commander's objectives. Operation Earnest Will provides an outstanding example of Army airpower used effectively to directly achieve strategic ends. Despite the challenges of Task Force Hawk, the mere presence of Army aviation may have contributed to the successful outcome of the campaign. Using doctrinal definitions, weaponeering evidence, and historical precedence presented in this chapter, the Army should consider modifications to its attack aviation doctrine to reflect its full strategic potential.

## CHAPTER 5

### CONCLUSIONS AND RECOMMENDATIONS

Army attack aviation is capable of achieving strategic effects in support of a theater commander's objectives. Despite the imprecise definitions of strategic war and strategic targets, the analytical evidence presented in this paper shows the destructive capabilities of the AGM-114 Hellfire missile, as employed on the Army's AH-64D Apache and OH-58D Kiowa Warrior attack helicopters, can have an effect on many strategic targets. Historical examples from Operation Earnest Will and Task Force Hawk also illustrate situations where Army aviation was used decisively in direct and indirect support of strategic and political objectives. Additionally, the principles of EBO that link tactical acts to strategic effects do not exclude Army attack aviation's use as a decisive strategic force. In fact, EBO techniques allow any tactical platform to contribute to a theater commander's strategic objectives. However, to take full advantage of its aviation capabilities, the Army must adjust its current doctrine, joint definitions should be more precisely worded, and Hellfire missile capabilities must be thoroughly studied.

As table 4 demonstrates, the AGM-114 Hellfire missile is suitable for a variety of strategic targets including information and communication systems, air superiority systems, maneuver systems, and logistical systems. Additionally, the AGM-114 can be used to destroy WMD, a doctrinal strategic target, or the systems that support them. Both the AH-64D and OH-58D can also affect strategic systems by operating in support of a deception or information campaign. By simply having an effect, destructive or nondestructive, on theater strategic systems, Army attack aviation achieves a strategic

impact. However, Army attack aviation possesses both strengths and weaknesses that must be considered prior to its use in support of strategic objectives.

The advantages of using Army attack aviation strategically include unique capabilities for observation, instant battle damage assessment, precision-guided weapons, and in some cases, rapid deployment. With its ability to hover and observe a target with a variety of sensors, Army attack aviation is uniquely suited for real-time target acquisition, finding hidden targets, and instant damage assessment. Additionally, the laser or radar guided Hellfire variants, with their small warheads, can precisely engage a strategic target while minimizing collateral damage. Additionally, as Operation Earnest Will demonstrated, Army attack aviation can rapidly deploy to accomplish non-standard missions. Despite these strengths, Army aviation also has weaknesses that can hamper its ability to operate strategically.

The disadvantages that Army attack aviation has in strategic warfare include doctrinal traditions, weather capability, range, and enemy air defense vulnerability. The Army's doctrine clearly states that its aviation assets operate tactically in support of ground forces. The close tie between Army air and ground forces, while historically understandable, can hinder aviation assets from operating independently in support of a strategic air campaign. Additionally, most of the targeting doctrine and weaponeering studies for Army attack aviation focus on armor and mobility targets, not on strategic targets. Attack aviation operations are also severely restricted in weather conditions below 500-foot ceilings and in visibility less than three kilometers--weather that many fixed-wing assets can avoid. The 120 kilometer to 150 kilometer range for most of the Army's attack aviation can also be a disadvantage, but that disadvantage is situational--

range may not be a factor in a small area of operation. Lastly, like any aviation assets, helicopters are vulnerable to certain enemy air defense systems. These disadvantages of doctrine, weather, range, and threat vulnerability may be daunting, but none of them prohibit the strategic employment of Army aviation. In fact, historically the Army has used its aviation assets independently to provide direct support of strategic theater objectives.

From 1987 to 1989, Army attack aviation was deployed in support of Operation Earnest Will. The purpose of this joint operation was to enforce the Carter doctrine by keeping the Persian Gulf open to international shipping, despite menacing attacks from Iranian naval units. Flying from USN ships, both special forces and regular Army aviation units achieved American strategic objectives by destroying most of Iran's naval patrol boats and assault craft. The small contingent of independent Army aviation forces contributed directly to theater strategic objectives. With mixed results, the Army tried to duplicate the successes of Earnest Will a decade later during Operation Allied Force.

Restricted by President Clinton from employing ground forces, the Army planned to contribute to the air campaign of Operation Allied Force by deploying AH-64A Apache helicopters to Albania. This aviation force, called Task Force Hawk, was ordered to conduct combat operations against Serbian ground forces in Kosovo. But, deployment delays, logistics requirements, and training deficiencies prevented the task force from accomplishing its mission. Taking about thirty days to deploy, bringing a large "support" package that included armor and artillery forces, and requiring excessive post-deployment training, the attack aviation assets of Task Force Hawk never flew a combat mission. Despite these setbacks, Army leadership argued that the mere presence of Task

Force Hawk achieved a strategic effect--the Serbian President quickly met the demands of NATO shortly after Task Force Hawk arrived in Albania. While this argument cannot be proven, it does illustrate an important EBO principle: any action is successful if it achieves a desired objective.

The principles of EBO, as applied to theater strategic objectives (illustrated in table 2), allow any tactical platform to achieve a strategic effect. The key to achieving a strategic effect is through proper enemy system analysis. Once theater objectives and the desired effect on those objectives are determined, causal links and tactical actions are ascertained. After the tactical actions are translated into targets, the targets are attacked with the best possible weapon system. At times, the ideal weapon system may be the Army's attack aviation. Therefore, the Army should write aviation doctrine and accomplish training that is flexible enough to support a theater commander's objectives.

The Army should revisit its aviation doctrine in FM 1-100, FM 1-112, and in the *AUTL*. Instead of discouraging its regular attack aviation assets from accomplishing missions outside the support of ground forces, Army doctrine should acknowledge its potential contributions to a strategic air campaign. FM 1-100 should eliminate the rhetoric tying its aviation assets to ground maneuver. Additionally, FM 1-112 should add a tenth mission to its list of commander's options for attack aviation that states, "Missions assigned by the theater commander." The Army should also commission a detailed study of Hellfire missile capabilities. A detailed understanding of Hellfire capabilities would not only expand the doctrinal limits of Army attack aviation, but also aid the employment of Hellfire missiles on unmanned aerial vehicles. Finally, the *AUTL* should acknowledge the strategic effects inherent in all aviation assets. It should

articulate that Army aviation, as well as other Army forces, can have a strategic effect that transcends across the spectrum of war. These changes in Army aviation doctrine should be accompanied by changes in joint doctrine that clarify the definition of strategic air warfare. Clarifications in joint doctrine would make it easier for the Army to accept a strategic role for its attack aviation.

The joint definitions of strategic warfare and strategic air warfare are imprecise and reflect the dated thinking of Douhet and Mitchell. Currently, military doctrine differentiates the levels of war by the level of leadership determining the objectives. But warfare is fought against an enemy, not against one's own decision-making system. Therefore, the joint definition of the strategic level of war should change to "Warfare designed to rapidly achieve a desired objective against the highest levels of an enemy decision-making system." Additionally, joint doctrine should eliminate specific target references in its definitions of strategic air warfare. The current definition of strategic air warfare is lengthy and should be changed to simply, "Air combat and supporting operations designed to affect a selected series of vital targets that affect an enemy's ability and will to wage war." By simplifying these joint definitions, the military services are more apt to apply the right force to support joint warfare.

Army attack aviation is capable of achieving strategic effects in support of a theater commander's objectives. The only obstacle the Army must overcome is its own doctrine, but that can easily be changed to reflect the historical reality of its attack aviation practices. By recognizing the full potential of its attack aviation assets, the Army can ease its transformation, better support the joint warfighting effort, and remain decisive in future conflicts.

## REFERENCE LIST

- Allen, Matthew. 1993. *Military helicopter doctrines of the major powers, 1945-1992*. London: Greenwood Press.
- Anderson, Jon R. 1999. "Hendrix speaks at AUSA symposium," 10 September. Headquarters V Corps press release. Headquarters V Corps, Heidelberg, Germany: Public Affairs Office. Available from [http://www.vcorps.army.mil/www/News/1999/september\\_10\\_ausa.htm](http://www.vcorps.army.mil/www/News/1999/september_10_ausa.htm). Internet. Accessed on 3 December 2002.
- Bingham, Price T. 2002. Seeking synergy: Joint effects-based operations. *Joint Force Quarterly* (spring): 52-59.
- Braden, James W. 1994. *From hot air to hellfire*. Novato, California: Presidio Press.
- Center for Army Lessons Learned (CALL). 2001. *Tactics, techniques and procedures from Task Force Hawk deep operations: Volume II, March 2001*. Fort Leavenworth, Kansas: U.S. Army Training and Doctrine Command. Newsletter No. 01-5.
- Chairman of the Joint Chiefs of Staff. 1999. *Universal joint task list (change 1, 1 November 1999)*. Washington DC: Chairman of the Joint Chiefs of Staff, 1 October. Chairman of the Joint Chiefs of Staff Manual 3500.04B.
- Cheek, Gary H. 2002. *Effects based operations--the end of dominant maneuver*. Strategy Research Project. 15 May. ADA401019. Available from [http://stinet.dtic.mil/cgi-bin/fulcrum\\_main.pl](http://stinet.dtic.mil/cgi-bin/fulcrum_main.pl). Internet. Accessed on 3 December 2002.
- Clark, Wesley K. 2001. *Waging modern war: Bosnia, Kosovo, and the Future of Conflict*. New York: PublicAffairs.
- Crist, David B. 2001-2002. Joint special operations in support of Earnest Will. *Joint Force Quarterly* (Autumn-Winter): 15-22.
- Deptula, David A. 2001. *Effects-based operations: Change in the nature of warfare*. Arlington, Virginia: Aerospace Education Foundation, Air Force Association.
- Drew, Thomas R., Major, USA. 2002. Army aviation for the operational commander: Can it get to the fight, and can it integrate into a joint air operation? Research Project, Naval War College, Newport, Rhode Island.

- Douhet, Giulio. 1983. *The command of the air*. Translated by Dino Ferrari. Washington, DC: Office of Air Force History.
- Gordon, J., B. Nardulli, and W. L. Perry. 2001-2002. The operational challenges of Task Force Hawk. *Joint Force Quarterly* (autumn-winter): 52-57.
- Hall, R. Cargill, ed. 1998. *Case studies in strategic bombardment*. Washington, DC: U.S. Government Printing Office.
- Howard, Michael, and Peter Paret, eds. 1984. *Carl von Clausewitz on war*. Princeton: Princeton University Press.
- Jackson, Paul, ed. 2001. *Jane's all the world's aircraft, 2001-2002*. Alexandria, Virginia: Jane's Information Group.
- Kandebo, Stanley W. 2002. Testing dispute clouds new helo. *Aviation Week and Space Technology*, 29 July, 64.
- Lambeth, Benjamin S. 1999. Control of the air: The future of air dominance and offensive strike. Essay, Conference sponsored by Australian Defense Studies Center, University of New South Wales, and Australian Defense Headquarters: Canberra, Australia, 15-16 November.
- \_\_\_\_\_. 2002. Task Force Hawk. *Air Force Magazine*, February, 78.
- Lange, Adam W., Captain, USA. 1998. Getting the most from a lethal missile system. *Armor*, January-February, 25.
- Lawrence, David L. 2002. Army aviation as an element of airpower. Research Project, U.S. Army War College, Carlisle Barracks, Pennsylvania.
- Nocks, Andrew, Lieutenant Colonel, USA. 2002. Interview by author 14 November, Fort Leavenworth, Kansas.
- Lennox, Duncan, ed. 2001. *Jane's air launched weapons, 2001*. United Kingdom: Jane's Information Group.
- Palmer, Michael A. 1991. *On course to Desert Storm: The United States Navy and the Persian Gulf*. Washington, DC: Naval Historical Center.
- Paret, Peter, ed. 1986. *Makers of modern strategy*. Princeton, New Jersey: Princeton University Press.

- Partin, John W. April 1998. *Special Operations Forces in Operation Earnest Will/Prime Chance I*. Hurlburt Air Force Base, Florida: U.S. Special Operations Command, History and Research Office.
- Reich, Bernard, and Major Stephan G. Gotowicki, USA. 1991. The United States and the Persian Gulf in the Bush administration. In *Royal United Services Institute and Brassey's Defense Yearbook*. London: Brassey's. Available from <http://call.army.mil/fmso/fmsopubs/issues/usgulf.htm>. Internet. Accessed on 3 December 2002.
- U.S. Congress. Senate. Senate Armed Services Committee. 1999. *William S. Cohen and Henry H. Shelton, joint statement on the Kosovo after action review. Testimony before the Senate Armed Services Committee*. 14 October. Available at <http://www.defenselink.mil/news/Oct1999.html>. Internet. Accessed on 3 December 2002.
- U.S. Department of Defense. 2001. Joint Publication 1-02, *Department of Defense dictionary of military and associated terms*. Washington, DC: U.S. Department of Defense (as amended through 7 May 2002).
- U.S. Department of the Air Force. Air Combat Command (ACC). 2002. *ACC white paper: effects-based operations*. Langley, Air Force Base, Virginia: Air Combat Command.
- \_\_\_\_\_. 2002. *Joint munitions effectiveness manual: air-to-surface with JMEM/AS weaponeering system (JAWS) version 2.2*. Washington, DC: U.S. Department of the Air Force, 23 January.
- \_\_\_\_\_. 1998. Air Force Doctrine Document 1-1, *Air Force task list*. Washington, DC: Chairman of the JTCG/ME, 12 August.
- U.S. Department of the Army. 2002. Field Manual No. 7-15, *Army universal task list*. Washington, DC: U.S. Department of the Army, 18 July.
- \_\_\_\_\_. 1997. Field Manual No. 1-100, *Army aviation operations*. Washington, DC: U.S. Department of the Army, 21 February.
- \_\_\_\_\_. 1997. Field Manual No. 1-112, *Attack helicopter operations*. Washington, DC: U.S. Department of the Army, 2 April.
- \_\_\_\_\_. 1996. Field Manual No. 6-20-10, *The targeting process*. Washington, DC: U.S. Department of the Army, 8 May.

- U.S. General Accounting Office. 2001. *Kosovo air operations: Army resolving lessons learned regarding the Apache helicopter*. Washington, DC: United States General Accounting Office, March. GAO-01-401.
- U.S. Joint Forces Command. 2001. *Draft paper: A concept framework for effects based operations*. Norfolk, Virginia: U.S. Joint Forces Command, 1 August.
- Wainwright, David. 2003. Should the Australian Army adopt effects based operations? Thesis, Army Command and General Staff College, Fort Leavenworth, Kansas.
- Watts, Barry D. 1984. *The foundations of U.S. air doctrine*. Maxwell Air Force Base, Alabama: Air University Press.
- Warden, John A. 1998. *The air campaign*. New York: toExcel.
- Weinberger, Caspar W. 1990. *Fighting for peace: Seven critical years in the pentagon*. New York: Warner Books.

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